Oregon
Theodore R. Kulongoski, Governor

OREGON DEPARTMENT OF ENERGY

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SENATE BILL 479 REQUIRES SCHOOLS TO REPLACE METAL HALIDE AND MERCURY VAPOR LIGHTING

Senate Bill 479 prohibits the use of R type metal halide or mercury vapor light bulbs in schools and requires that schools replace R type metal halide and mercury vapor light bulbs with T type metal halide or mercury vapor light bulbs or alternative lighting. **This Bill exempts stadium fields and outdoor athletic fields.**

This means that public school districts are required to replace all metal halide or mercury vapor R type lamps with a T type self extinguishing lamp or replace the metal halide or mercury vapor lighting fixture with an alternative lighting source. Linear fluorescent lighting can be installed as an alternative lighting source in most indoor applications where metal halide or mercury vapor light fixtures are currently being used.

T Type Lamps

T type lamps are currently not available in wattages other than 400-watts. We are currently unable to find self extinguishing mercury vapor lamps. The following lamp manufacturers offer T type self-extinguishing bulbs for installation in 400-watt metal halide fixtures.

General Electric:	Safe-T-Guard Multi-Vapor (MVT) Series
Osram/Sylvania:	Metalarc Safeline series
Phillips:	Safety Lifeguard series

Alternative Lighting Source

Linear fluorescent fixtures are commonly used to replace metal halide and mercury vapor fixtures in indoor lighting applications. Refer to attachment B for an example of common replacement options for a 400-watt metal halide lighting system.

Replacing metal halide or mercury vapor lighting systems with linear fluorescent lighting fixtures will save energy and cost for the school district. There are several incentive options for school districts that choose to replace their metal halide or mercury vapor fixtures with linear fluorescent fixtures.

FINANCIAL INCENTIVES AND OPTIONS

If new lamp sources and new fixtures are selected for implementation, there is a variety of funding sources available to nearly all districts. The following chart lists some of the available funding opportunities. At this time, ODOE knows of no grant funding available for these projects.

Utility Incentives →	Schools PPF pays up to 100% of project cost	or	Energy Trust PPF *provides a $ incentive per fixture*	or	Public Utility Funds *provides a $ incentive per fixture*	
	+					
Business Energy Tax Credit Program →	Pass-Through Payment 25.5% or 30.5% if Project Cost less than $20,000					

School Districts Served by PGE or Pacific Power *(must be coordinated through ODOE)*

School Public Purpose Funds. Public schools served by Pacific Power or Portland General Electric (PGE) receive Public Purpose Funds. If the simple payback is determined to be less than 15 years, Public Purpose Funds can be used to replace metal halide or mercury vapor fixtures with high efficiency linear fluorescent fixtures.
http://egov.oregon.gov/ENERGY/CONS/SB1149/Schools/index.shtml

Energy Trust of Oregon Public Purpose Funds. For metal halide fixture replacement, school districts served by Pacific Power or PGE can choose to use either Public Purpose Funds or Energy Trust Funds, but not both. Custom Energy Trust incentives are 25 percent of the total approved project cost, not to exceed 12¢/annual kWh. Also, private schools served by Pacific Power or PGE may be eligible to receive incentives through the Energy Trust.

School Districts NOT Served by PGE or Pacific Power

Public Utility Funds. Oregon schools served by public electric utilities may be eligible for incentives to install new fixtures in their facilities. Many utilities have their own conservation program, or are affiliated with Bonneville Power Administration's Commercial and Industrial Lighting Offer program. Contact your local electric provider to see if incentives are available.

All School Districts

ODOE Business Energy Tax Credit Program (BETC). In addition to using potential utility incentives, all schools in Oregon can utilize the Pass-Through Partner Option of the Business Energy Tax Credit (BETC) Program. The pass-through payment to the school district can be 25.5 percent of the eligible project cost, or 30.5 percent if the total project cost is less than $20,000.
http://egov.oregon.gov/ENERGY/CONS/BUS/tax/pass-through.shtml

ODOE State Energy Loan Program (SELP). If other funds are not available, the Oregon Department of Energy has a low interest loan program that may be used to fund the remaining project cost after utility incentives and BETC pass-through payments. Loans can be structured where payments are made based on energy savings.
http://egov.oregon.gov/ENERGY/LOANS/selphm.shtml

Each of these programs has guidelines and requirements that must be followed. In all cases you must apply for the incentive before the project begins.

Before you start your project please contact:

Oregon Department of Energy (school public purpose funds, BETC, SELP)
1.800.221.8035

Energy Trust of Oregon, Inc.
Contact Will Miller, 503-243-7844, will.l.miller@lmco.com.

Public Utilities
Contact your service provider

Attachment A
IMPLEMENTATION STRATEGY

Implementing a metal halide fixture replacement project involves several steps that are intended to supplement the requirements of the utility programs, BETC program, and the SELP program. An energy analysis is performed first, followed by detailed design, construction and documentation.

These tasks can be performed by an existing network of consultants and contractors, and suppliers. ODOE maintains a list of qualified energy auditors who can evaluate the existing systems, make recommendations, provide detailed design criteria, and document the project. Energy Trust maintains a list of Trade Allies who can analyze, design, construct, and document the project. Public electric utilities may have auditors on staff, or provide their own list of auditors, who can evaluate the project. Many lighting equipment suppliers can also perform selected supplemental analysis tasks, including software simulation to estimate the proposed light levels. This strategy is intended for spaces where the new fixtures are installed in the same location as the existing fixtures. This procedure is not intended to address other potential upgrades that would logically require additional design tasks, such as installing fixtures in new locations.

Energy Analysis

1. **Document Existing Conditions**
   a. Fixtures: Type, lamp type and wattage, quantity, nominal spacing between fixtures in both directions, annual hours of operation
   b. Space Geometry: Dimensions of space, ceiling or roof height, fixture location (height above floor), approximate reflectance values of ceiling, walls and floor surfaces.
   c. Light Levels: measure and document foot candles in several places.
2. **Document Proposed Conditions**
   a. Select an appropriate T5HO or high efficiency T8 fluorescent fixture based on input from the auditor, contractor, or another school district.
   b. Identify proposed fixture wattage and hours of operation.
3. **Document the Energy Efficiency Measure**
   a. Provide a description of the existing conditions and recommended changes
   b. Calculate electrical savings (consumption, demand, and cost), plus heating and cooling interaction, associated with the upgrade.
   c. Provide a measure cost total with values for material, installation labor, and overhead and profit if available. Calculate simple payback.
   d. Ask a qualified auditor, lighting contractor or supplier to provide computer simulations of existing and proposed light levels
   e. Provide cut sheets for selected fixture with specific options highlighted.

Detailed Design. Detailed design can be an expansion of the energy analysis results. In many cases, the energy analysis provides design criteria that can used for contractor proposals or bids. Or additional design tasks may be needed.

Construction. Construction tasks will vary, depending on the extent of the project. School districts that are only replacing fixtures in one or two spaces may want to solicit bids from multiple contractors. Other districts, with many spaces to retrofit, may need to pursue the public procurement process. Each district must decide the appropriate procurement method.

Documentation. After new fixtures are installed, compile reimbursement forms, invoices and other documentation needed by the agencies providing funds. ODOE, Energy Trust or your electric provider can assist with specific documentation requirements.

Attachment B
Technical Specifications

The following table compares performance parameters for three most common lamp/ballast systems used in large high-ceiling spaces in schools (such as gymnasiums, cafeterias, multi-purpose spaces and commons areas). Although there are other lamp wattages, the most common baseline 400-watt metal halide system is compared with typical six-lamp T8 and four-lamp T5HO systems.

System Parameter	400-watt Metal Halide High Bay – typical	F32T8 (Six Lamp)	F54T5HO (Four Lamp)
Initial Lamp Output (lumens)	36,000	3,100	5,000
Mean Lamp Output (lumens)	23,500	2,945	4,650
System Output (lumens)	23,500	21,200	18,600
Ballast Type	Magnetic	High Ballast Factor Electronic	Normal Ballast Factor Electronic
Ballast Qty	1	2	2
Ballast Power (watts)	458	222	240
Efficacy (mean lumens per watt)	51	94	78
% Efficacy Improvement		84%	53%

Lamp Lumen Depreciation	65%	95%	93%
Lamp Service Life (hrs)	20,000	24,000	20,000
Color Rendering Index	65 (clear) or 70 (coated)	82	82
Switching Strategies	Leave on during occupied period	Can turn off when unoccupied, with manual or automatic control	Can turn off when unoccupied, with manual or automatic control
Ballast Sound Rating	B	A	A

Annual Consumption, Cost per Fixture	1,145 kwh, $85.87	555 kwh, $41.62	600, $45.00
Savings / Fixture, kwh - $		590 kwh - $44.25	545 kwh - $40.87
Estimated Cost / Fixture		$300 - $500	$325 - $500
Simple Payback, without Incentives		6.8 – 11.3	7.9 – 12.2

Table notes: Annual Savings Assumptions: Fixtures operate 2,500 hours annually. Electric cost averages $0.075/kwh. Estimated Cost / Fixture varies depending on quality, light distribution, wiring configuration, fixture options and accessories.

The fluorescent efficacy improvements of 50 to 80 percent when compared to standard metal halide systems are the principal reason for the significant energy savings. Similar savings may be realized for replacing 250-watt or smaller metal halide fixtures, because the fluorescent replacement technology has a higher efficacy (lumens per watt) than the existing metal halide system. However, savings per fixture for lower wattage replacements will likely be less and the fixture cost may not decrease proportionally. On an individual evaluation, a 250-watt replacement may have a higher simple payback than a 400-watt replacement.